(Application, page 18, lines 11-12). This is accomplished by "physically attaching the single-layer SLMs together, e.g., attaching adjacent glass plates together with optical cement" (id., lines 13-14) and "by optically coupling single-layer SLMs, e.g., optically imaging the output from one SLM pixel array as an input to another pixel array or by using a single-mode fiber to couple together multiple sets of compensation subsystems" (id., lines 14-17). One skilled in the art would recognize that a multilayer SLM may be formed by attaching multiple single-layer SLMs together with optical cement, the single-layer SLMs continuing to function independently of one another and thereby comprising "multiple spatial light modulators", and further that attaching single-layer SLMs together with optical cement yields "multiple spatial light modulators optically coupled to one another" as recited by claims 80-83.

Further, one skilled in the art would understand that "using a single-mode fiber to couple together multiple sets of compensation subsystems" provides for optically coupling multiple SLMs together using a fiber, since each SLM is a compensation subsystem and may be operated independently of the other SLMs. Thus, the Application also fully supports "spatial light modulators [that] are optically coupled to one another by an optical fiber" as recited by claims 80-83.

Accordingly, all of the subject matter covered by claims 80-83 is fully supported by the Application and we therefore ask that the rejection under 35 U.S.C. § 112 be withdrawn.

Rejection over Brophy in view of Jopson

Claims 1, 3-11, 17-19, 49 and 77 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Brophy et al., U.S. Patent No. 6,275,623 ("Brophy") in view of Jopson et al., U.S. Patent No. 6,385,357 ("Jopson"). The Action admits that "Brophy differs from claims 1 and 77 of the present invention in that Brophy does not specifically discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal" (Action at page 3) and alleges that "Jopson discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal" (id.) The Action further alleges that "it would have

been obvious to a person of ordinary skill in the art to include the teaching of Jopson in the system of Brophy" (id.) We traverse. It would not have been obvious to one skilled in the art to combine the teachings of Brophy and Jopson for at least three reasons: namely, because Brophy does not teach or make any reference to polarization effects, such as polarization mode dispersion ("PMD"), or their compensation; because Brophy teaches away from the serial approach to PMD compensation taught by Jopson; and because a purported combination of Brophy and Jopson would not correct for PMD by adjusting the SLM.

First, Brophy makes no suggestion or reference whatsoever to polarization mode dispersion, and therefore one skilled in the art, upon reading Brophy, would not be motivated to modify Brophy to include the teachings of Jopson. There is no suggestion that Brophy intends his filter to be used for compensating polarization effects such as PMD because Brophy's filter is used to control optical power, *i.e.* optical intensity, in various spectral output channels. In Brophy's filter, "a spectral monitor distinguishes optical power among the channels" (Brophy, col. 2, lines 1-2) and a controller "compares a monitored optical power distribution among the channels to a desired power distribution and adjusts the spatial light modulator to minimize differences between the monitored and desired power distributions" (id., lines 9-13). There is no indication that wavelength-dependent polarization effects present any difficulties for Brophy's filter. In fact, Brophy takes explicit steps to ensure that the polarization of his input beam is linear prior to its entrance into the filter, thereby obviating wavelength-dependent polarization effects. Brophy states that "a polarization manager is preferably used to linearly polarize the channels before first encountering the polarization-sensitive diffractive optic" (id., col. 3, lines 4-6). Therefore, one skilled in the art would not assume, after reading Brophy, that PMD effects present a problem for Brophy, and would find no motivation to combine the teachings of Jopson with Brophy's filter, as the Action alleges.

Second, even assuming that one could find some suggestion in Brophy that would indicate that PMD is a problem in his filter, one skilled in the art would not be motivated to combine the teaching of Jopson with Brophy because Brophy teaches away from the serial approach to PMD compensation disclosed in Jopson. The PMD compensation technique in

Jopson does *not* involve "spatially dispersing frequency components ... on a spatial light modulator" as recited in claim 1, nor does it involve "a dispersive module positioned to receive the optical signal and spatially separate frequency components of the optical signal" with "at least one SLM positioned to receive the spatially separated frequency components" as recited in claim 77. Instead, Jopson uses a *serial* arrangement of components to compensate for PMD over a range of frequencies (*e.g.* see Jopson, polarization pair controller 720 and compensator 745 comprising two adjustable sections of polarization preserving fiber as shown in Figures 7 and 8b and described in the corresponding text).

Accordingly, Brophy teaches a filter wherein frequency components are processed in *parallel* by a spatial light modulator, and therefore teaches away from the *serial* arrangement of components disclosed by Jopson. It is not clear how Brophy and Jopson could be combined as alleged in the Action to provide the subject matter covered by the claims. Jopson's components cannot be used internally within Brophy's filter because Brophy's filter requires that frequency components be dispersed spatially by a diffractive element, while Jopson's method requires that frequency components follow a common spatial path through his serial components. Alternatively, if Jopson's components were introduced either prior to or following Brophy's filter, then the combination of Brophy and Jopson would not cover "independently adjusting the polarization transfer matrix of multiple regions of the at least one SLM to reduce the distortion of the optical signal" as recited by claim 1, nor causing "the at least one SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion of the optical signal" as recited by claim 77, because the reduction in distortion of the optical signal would still be performed by Jopson's components, not by Brophy's SLM. Therefore, in view of the incompatibilities between the methods of Brophy and Jopson, one skilled in the art would not be motivated to combine these two references because the references teach away from one another, and it is not at all clear how such a combination would be made, if it is indeed possible at all.

Third, even if one did find some suggestion in Brophy of the presence of, and desirability of correcting for, PMD, and even if one skilled in the art was able to somehow combine these

references, which neither point do we concede, the combination of Brophy and Jopson still would not provide the subject matter covered by the rejected claims because it would not be possible for a purported combination of Brophy and Jopson to correct for PMD by adjusting Brophy's SLM.

In fact, Brophy takes steps to ensure that his filter is *not* sensitive to polarization effects, therefore making such corrective action impossible. He uses a "polarizing system [in order to] avoid the effects of polarization sensitivities through the filter" (Brophy, col. 2, lines 26-27). His polarizing system "is preferably used to linearly polarize the channels before first encountering the polarization-sensitive diffractive optic" (id., col. 3, lines 4-6). In other words, by employing his polarizing system, Brophy discards from the input beam all of the polarization information that he would need to correct for PMD. The suggested combination of Brophy and Jopson therefore would not provide for "independently adjusting the polarization transfer matrix of multiple regions of the at least one SLM to reduce the distortion of the optical signal" as recited by claim 1, nor causing "the at least one SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion of the optical signal" as recited by claim 77, because the polarization information from the original beam entering Brophy's filter would lost, thereby preventing the action of reducing distortion of the optical signal by adjusting Brophy's SLM.

Further, and as discussed above, Brophy uses a *parallel* approach to processing wavelength components in his optical beams, and Jopson discloses a *serial* approach to correcting wavelength-dependent polarization effects. Therefore, even if the teachings of Jopson were introduced into Brophy, the action of reducing the distortion in an optical signal would still be performed by Jopson's serial components, not by adjustment of the SLM, as required by the rejected claims.

In view of the foregoing, we ask that the rejection under 35 U.S.C. §103(a) be withdrawn.

Rejection over Wefers in view of Brophy and in view of Jopson

Claims 1, 3, 4, 6, 10-24, 70, 73, 74 and 77 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Wefers et al., U.S. Patent No. 5,719,650 ("Wefers") in view of Brophy and further in view of Jopson. The Action purports to combine Wefers and Brophy, but admits that "the combination of Wefers and Brophy differs from claim 1 of the present invention in that Wefers and Brophy do not specifically discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal" (id. at pages 6-7). The Action alleges that "it would have been obvious to a person of ordinary skill in the art to include the teaching of Jopson in the system of Wefers and Brophy ... in order to change the polarization of the wavelength" (id. at page 7). We traverse. There would have been no motivation to combine the teachings of Jopson relating to PMD compensation with Wefers and Brophy, nor would such a combination yield the subject matter covered by the rejected claims, for at least three reasons.

First, there is no suggestion in either Brophy (as discussed above) or Wefers that indicates that PMD is present or problematic. Wefers successfully demonstrates independent control over both *x*- and *y*-polarized beams (see Wefers, Fig. 8). There is no suggestion or implication in Wefers (or Brophy) that PMD is present or requires compensation, and one skilled in the art would therefore find no motivation to introduce the teachings of Jopson into a purported combination of Wefers and Brophy to solve the problem of PMD where there is no suggestion that such a problem exists.

Second, Wefers, like Brophy, teaches a *parallel* technique for processing wavelength components, while Jopson teaches a *serial* approach to PMD compensation. Wefers and Brophy each teach away from a purported combination with Jopson. The incompatibilities between these techniques, as discussed above, are such that one skilled in the art would not find motivation to introduce Jopson into a combination of Wefers and Brophy, because it is unclear that it would even be possible to do so.

Third, Wefers, like Brophy, takes explicit steps to ensure that his input beam is linearly polarized on entering his SLM and *cannot* exhibit effects due to PMD. Further, by linearly

polarizing his input beam, Wefers (like Brophy) discards the polarization information that would be needed to correct for PMD using his SLM. Therefore, a purported combination of Wefers and Brophy with Jopson cannot provide the subject matter covered by the rejected claims. Wefers states that "the input optical field is substantially polarized along a polarization axis" (Wefers, col. 2, lines 19-20) and that input optics should be chosen "to polarize the input pulse with a high (e.g. 100:1) extinction ratio" (id., col. 6, lines 36-38). In other words, once the input field is converted to a field that is linearly polarized along a single direction, there is no longer any PMD because the field has the same polarization throughout its spectral bandwidth. PMD compensation would not even be possible after passing the input field through a polarizer, since the field would no longer contain the frequency-dependent polarization information needed to compensate for PMD. Therefore, Wefers and Brophy could not be used in combination with Jopson to provide for "independently adjusting the polarization transfer matrix of multiple regions of the at least one SLM to reduce the distortion of the optical signal" as recited by claim 1, nor causing "the at least one SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion of the optical signal" as recited by claim 77, because the information describing distortions in the optical signal is lost on entering the SLM of Wefers.

Further, even if one did find some motivation to introduce Jopson's teachings into Wefers and Brophy, and even if such a combination were possible, which neither point do we concede, the three references in combination still would not disclose the subject matter covered by the rejected claims. Both Wefers and Brophy use a parallel approach to processing wavelength components, where Jopson discloses a serial approach to correcting wavelength-dependent polarization effects. As discussed above, while it is not clear how such a combination would be made, that is, how Jopson's components would be introduced into the system of Wefers and Brophy, Jopson's serial components would still be responsible for correcting PMD effects, and therefore the action of reducing the distortion in an optical signal would still be performed by Jopson's serial components, not by adjustment of the SLM, as required by the rejected claims.

In view of the foregoing, we request that the rejection under 35 U.S.C. § 103(a) be withdrawn.

Summary

We believe that the application is currently in condition for allowance, which we request.

Please apply any other charges or credits to deposit account 06-1050, referencing 12818-003001.

Respectfully submitted,

Date: 9/16/05

Marc M. Wefers
Reg. No. 56,842

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906